

FACTUAL REPORT

Accident Identification

Accident No. DCA-01-MM-008
Vessel: *Port Imperial Manhattan* Official Number: D916221
Accident Type: Fire
Location: Underway, off 38th Street Pier, Manhattan, N.Y.
Date: November 17, 2000

Prepared by Robert Ford
Investigator

15 Pages Total (Including cover)



National Transportation Safety Board

Washington, D.C. 20594

Office of Marine Safety

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Factual Information

Accident Summary

On November 17, 2000, the U.S. small passenger vessel *Port Imperial Manhattan* departed the 38th Street terminal in Manhattan bound for the Lincoln Harbor terminal in Weehawken, New Jersey. There were eight passengers and three crewmembers on board. Within minutes of leaving the dock, the vessel lost throttle and steering capabilities and a fire was discovered in the engineroom. The crew attempted to extinguish the fire using portable extinguishers. Moments before the entire vessel was engulfed in flames, the passengers and crew were evacuated from the *Manhattan* on to another company vessel, *George Washington*. The three crewmembers and two out of the eight passengers were treated and released from a local hospital.

Accident

At approximately 1420 on November 17, 2000, one master and two deck hands relieved the day crew of the New York Waterways small passenger vessel *Port Imperial Manhattan* for the evening shift ferry operations.¹ The vessel was on a regular run from the 38th Street Manhattan ferry terminal to Lincoln Harbor terminal in Weehawken, New Jersey. The night shift captain stated that after he relieved the day shift captain he continued to run the boat. The day shift captain stated that he had no problems on the day of the accident.

¹ The *Port Imperial Manhattan* operated from 0700 to 2300 daily. Two crews each worked an eight-hour shift.

At approximately 1855, the *Manhattan* had departed the 38th Street Ferry Terminal in Manhattan with three crewmembers and eight passengers on board. The senior deckhand (hereafter referred to as deckhand #1) was in the pilot house and deckhand #2 was in the main cabin taking a passenger count. The voyage was less than fifteen minutes in duration; therefore the Coast Guard had given NY Waterways a waiver from the requirement to provide passengers with a verbal safety briefing at the outset of the voyage. The three crewmembers alternated making hourly visual inspections of the engine space in order to check the engine temperatures and to determine the overall condition in the space. The most recent inspection of the engine space had been approximately one hour earlier.

The captain had turned over the wheel to deckhand #1 so that he could eat dinner and while facing aft he observed smoke coming from the port ventilator to the engine space. At the same moment, deckhand #1 reported that the throttle felt like it was losing air. The captain sent the deckhand to the engine space to investigate and used the VHF radiotelephone to contact another company boat *Henry Hudson*. He requested that the *Hudson* standby until the cause of the smoke could be identified. Immediately following the radio transmission the vessel lost propulsion, steering and power to the VHF radio.

Both deckhands proceeded to the engine space entry door located aft, port side in the main cabin. Contrary to accepted firefighting practice, the deckhands opened the aluminum door without first using their hands to check for heat inside the space. Both deckhands stated that they received an electrical shock while holding the door open and were unable to enter the space due to the smoke. Flames were visible between the ladder rungs. The fire pump starting switches were located in the engineroom and could not be reached.

The deckhands propped open the door with two lifejackets and deckhand #1 discharged into the engineroom the CO2 extinguisher that had been stowed on the stern. Deckhand #2 went to the pilothouse and told the captain that there was a fire in the engineroom and that they could not control the fire. He then offered to shut off the fuel supply valve in the main passenger cabin. The captain agreed that the fuel supply should be shut and dispatched the deckhand to accomplish this task. After shutting the valve, deckhand #2 returned to the engineroom door to assist deckhand #1 fight the fire.

After completely discharging the first CO2 extinguisher into the engineroom, deckhand #1 ordered the passengers to evacuate the main cabin because it was filling with smoke and to proceed to the foredeck. The deckhand did not distribute lifejackets and the passengers interviewed did not consider the fire to be life threatening at the time. Deckhand #1 did not inform the passengers of the seriousness of the fire.

Deckhand #1 went to the pilothouse to inform the captain of the situation while deckhand #2 went to the main cabin to get another extinguisher that was stowed in the main cabin. In the pilothouse the captain reminded deckhand #1 that he had a personal cellular telephone. He instructed the deckhand to call the 911 operator and company managers and notify them that there was a fire on board the vessel. The captain then went to the main cabin and saw heavy

smoke in the cabin. He returned to the bridge, sounded the vessel's horn repeatedly to signal to other vessels in the area that the *Manhattan* was in distress.

The 911 operator transferred the call to the New York City Fire Department and a fireboat was dispatched to the location. The company operations manager was notified by cell phone and he diverted the company vessel *George Washington* to the scene.

The captain went to the engineroom door and saw deckhand #2 discharging the second fire extinguisher into the space. The deckhand stated that both of the extinguishers discharged into the engineroom were dry chemical extinguishers. The captain grabbed several lifejackets from the stowage locker and went outside while the deckhand lashed open the stern door to let the smoke out of the main cabin. The captain returned to the engineroom door and told the deckhand to evacuate the space and move to the bow. The doors to the stern and engine space were not closed prior to evacuating the main cabin.

While the crew attended the fire, the passengers had gathered on the open foredeck of the vessel and discussed amongst themselves the severity of the fire and what actions they should take, including whether they needed lifejackets. Some passengers had cellular telephones and used them to call the 911 operator. One passenger stated that he realized that the passengers and crew might have to abandon the vessel and jump into the Hudson River. He returned to the main cabin to retrieve lifejackets because, he stated, he did not want to be in the river without a personal floatation device. The main cabin lost electrical power to the lights not long after the passengers were on the foredeck.

After the captain and second deckhand got to the foredeck, the second deckhand observed that some of the passengers had donned lifejackets. The passengers later stated that they decided to don the lifejackets because they feared that they might have to abandon the vessel by jumping into the river. The second deckhand noticed that two passengers were having difficulty donning their lifejackets. One passenger had been given a child size lifejacket so the deckhand gave the passenger his float coat. Another passenger was having difficulty donning the lifejacket because the jacket straps had been wrapped and clipped around the jacket. By this time, the fire had spread to the main cabin and the crew could no longer return to the main cabin and retrieve additional lifejackets.

The captain told the deckhands to prepare to launch the rigid buoyant apparatus that were stowed on top of the pilothouse.² The deckhands had trouble freeing the apparatus because they could not see the dark lines of the buoyant apparatus in the darkness and the painters had to be cut. One passenger volunteered to assist the deckhands carry the buoyant apparatus down to the foredeck. After the buoyant apparatus were moved to the foredeck, the deckhands prepared the

² The rigid buoyant apparatus are flotation devices with a line attached around its periphery. Survivors in the water hold onto this line. The apparatus lacks a platform to support survivors in the water. The *Manhattan* was not required to carry rigid buoyant apparatus in accordance with 46 CFR Subchapter T part 180.207(d), but carried seven voluntarily.

abandon ship ladder over the ship's side so that it would be in place should abandonment over the side become necessary.

About this time there was an explosion in the after part of the vessel where the major fire was located and one passenger had to be restrained from jumping into the river. The entire main deck cabin was on fire and the passengers and crew were on the foredeck shouting for assistance to other vessels that were passing by. The passengers reported seeing vessels pass by without stopping to provide assistance.

Minutes after the explosion, a New York City fireboat approached the *Manhattan* and then backed away when it became apparent that the passengers could not easily gain access to that vessel. After the fireboat backed away, the NY Waterway ferry *George Washington*, which was similar in size to the *Manhattan*, approached the *Manhattan*. The *Washington* came bow to bow to the *Manhattan* and all passengers and crew were able to step directly from the *Manhattan* on to the *Washington*. The passengers stated that within thirty seconds of leaving the *Manhattan* flames engulfed the foredeck of the vessel where they had been standing. The New York City fireboat pushed the *Manhattan* alongside pier 42 where NYFD assets extinguished the fire.

The *Washington* took the passengers and crew to the Port Weehawken terminal where the NY Waterways operations manager had two ambulances waiting. Two crewmembers and one passenger were sent to a local hospital for evaluation. One crewmember was treated at the hospital for muscle pain and one passenger was treated for smoke inhalation. The remaining six passengers declined medical treatment. Post accident alcohol and drug testing was conducted at the hospital.

After Coast Guard inspectors verified the structural integrity of the vessel, the New York Waterways ferry *John Stevens* towed the *Manhattan* to the Port Imperial Ferry Terminal in Weehawken, New Jersey. The *Manhattan* arrived at the terminal around midnight and was safely moored to the dock.

Injuries

Five of the eleven persons on board the *Port Imperial Manhattan* were taken by ambulance to Palisades General Hospital in Weehawken, N.J. Two of the crewmembers and one passenger were sent for evaluation. One crewmember was treated for muscle pain and one passenger was treated for smoke inhalation. The remaining six passengers declined medical treatment.

One passenger declined medical treatment on the night of the accident, but sought treatment two weeks later for smoke and chemical inhalation.

Company

Company — NY Waterway began operations in 1986 as Port Imperial Ferry and provided service across the Hudson River between New Jersey and Manhattan. The company was a family owned business that had 23 boats with one additional boat under construction. The company had expanded to operate ten ferry routes, sightseeing and dinner cruises and service to Yankee and Shea Stadiums during baseball season.

U.S. Coast Guard Activities New York stated that NY Waterways operated the largest fleet of small passenger vessels within the New York zone and carried 20,000 to 30,000 passengers each day.³ However, the Coast Guard stated that the vessels were not considered "ferries" in accordance with the regulations. Ferry routes are strictly defined while NY Waterway vessels are less specific. The vessels are used for dinner cruises as well as sightseeing and excursion tours.

Operations—The *Manhattan* operated on a regular scheduled service between the 38th Street terminal in Manhattan to Lincoln Harbor, Weehawken, New Jersey. The service operated from 0700 until 2300 with a transit time of approximately seven minutes.

Crew

Master — The master had been in the marine industry since 1994. At the time of the accident, the master, 30, had been working for NY Waterway since January of 2000. He had worked as a deckhand until April 2000 and in May he was promoted to master and served on various vessels and routes. From June 30, 2000 until the night of the accident he served as master on the *Manhattan*.

He held a U.S. Coast Guard license as Master, near coastal steam or motor vessels of not more than 100 gross tons. He had first received his license in June 1999. He had not received any formal fire fighting training.

The master stated that he had gone to bed between 11 and 12 p.m. on each of the preceding nights. He stated that he had arisen at 9 a.m. on the day of the accident and was well rested.

Senior Deckhand (#1) — The senior deckhand, 20, had been with the company for one year and seven months. He started working for the company after graduating from high school.

³ For contrast, the officers stated, the Staten Island Ferry Service carries 60,000 passengers each day. However, Staten Island Ferries are inspected and regulated under a different set of regulations. New York Waterways vessels are all inspected and regulated under 46 CFR Subchapter T while Staten Island Ferry vessels are inspected and regulated under 46 CFR Subchapter H.

He did not hold, nor was he required to hold, any Coast Guard certificates or endorsements. He had not received any formal fire fighting training. He had worked on other boats on different shifts and had worked on the *Manhattan* on previous occasions. He began the new shift on the *Manhattan* the same week as the accident.

Deckhand (#2)– The deckhand, 27, had worked for the company for one and one-half years. All of his marine experience was on the company vessels. He had not received any formal fire fighting training and did not hold any Coast Guard certificates or endorsements.

Vessel Information

General – Gulf Craft, Inc., in Patterson, La., built the Port Imperial *Manhattan* in 1987. It was an aluminum passenger vessel certified by the U.S. Coast Guard to carry up to 350 passengers and could operate on lakes, bays and sounds not more than one mile from shore. The *Manhattan* was owned and operated by NY Waterway and operated primarily as a passenger vessel. The vessel operated under a U.S. Coast Guard Certificate of Inspection (COI) in accordance with 46 CFR Subchapter T- Small Passenger Vessels (Under 100 Gross Tons).

The *Manhattan* had one main continuous deck with an enclosed area (main cabin) for 156 persons seated and 88 standing. The upper deck consisted of the enclosed pilothouse and an open space for 161 seated and 72 standing passengers. Access to the engine space was from the main cabin, port side aft, with one ladder down to the space.

The vessel was fitted with an enclosed pilothouse on the forward end of the vessel. The pilothouse was equipped with magnetic compass, 1 Furuno radar, 1 sandpiper depth gauge and 2 Horizon vhf radios.

Crew to Passenger Requirements– In accordance with the Certificate of Inspection, the following crew were required per passenger:

<u>Number of Passengers</u>	<u>Required Crew</u>
1 - 149	1 Master, 2 Deckhands
150 - 299	1 Master, 1 Licensed Mate, 1 Deckhand
300 - 350	1 Master, 1 Licensed Mate ⁴ , 2 Deckhands

⁴ The Licensed Mate can be substituted with a "Senior Deckhand", designated in writing by the Master and qualified in accordance with NVIC 1-91.

Principal Characteristics--

Built:	1987
Length:	87.2 feet
Breadth:	24.4 feet
Depth:	8.0 feet
Gross Tons:	94.0
Net Tons:	64.0
Propulsion:	Two 750-horsepower Caterpillar Diesel engines.

Engine Room-- The *Port Imperial Manhattan* was very similar in design to another company vessel, the *New Jersey*. By examining and comparing the two vessels, a layout of equipment and wire cables was determined.

Access to the engine room was through an insulated, aluminum door near the aft end of the vessel. The door faced outboard towards the port side of the vessel. The ladder into the space was located near the aft end of the engine room on the centerline of the vessel. It stepped down in a port to starboard direction (athwartships).

A hydraulic tank was located athwartships from the ladder, on the port side, adjacent to the skin of the vessel. The tank provided the hydraulic fluid for the steering system. The port and starboard engines were located towards the forward engine room bulkhead. A generator was located on the centerline adjacent to the forward bulkhead.

Forced air supply to the engine room was from two vents located on the open upper deck. There were two natural supply plenums outboard (port and starboard) on the main deck that provided natural air to the engine room.

12 Volt Electrical System-- Two twelve-volt batteries were located beneath the ladder. They were connected to individual knife switches with #2 AWG wire. A third knife switch was available to provide crossover capabilities in the event one battery died. Each battery provided the supply load to separate circuits in the pilothouse. The knife switches fed to two 100 amp fuses. The knife switch box was not fused to the batteries. From the fuse box, the cable fed into a plastic junction box located above the hydraulic tank.

At the junction box, lug bolts to three 12-volt DC wires married the supply cable; two of the wires were the same size and one wire was smaller. The wires ran from the junction box through the forward bulkhead and continued to two 12-volt distribution panels in the pilothouse. The cables supplied 12-volt power to the pilothouse.

The section of the system between the batteries to the junction box was installed during a 1992 conversion. The vessel originally had a 32-volt DC starting system and the batteries were located at the forward bulkhead. The modification relocated the batteries to the aft end of the engine room beneath the ladder. The existing wiring prior to the conversion did not have the

reach to the new battery location. The new feed wire and junction box were installed to provide the extra reach to the batteries.

Pilot House Distribution Panels – 12 Volt

Fwd Pilot House Distribution Panel

<u>Equipment</u>	<u>Rated Load</u>	<u>Breaker Trip</u>
Radar	7.8A	10A
Stbd Head Lights	7.5A	10A
Fwd Deck Lights	4.0A	6A
Aft Deck Lights	7.3A	10A
Control Air Alarm	2.0A	6A
Fluorescent Lights	4.0A	6A
Console Lights	4.0A	6A
Panel Lights	3.7A	6A
Red Lights	1.1A	6A
Stbd. Window Wiper	3.8A	6A
Center Window Wiper	3.8A	6A
Port Window Wiper	3.8A	6A
Rudder Angle Indicator	3.0A	6A

Total Load 55.8 Amps

Aft Pilot House Distribution Panel

<u>Equipment</u>	<u>Rated Load</u>	<u>Breaker Trip</u>
Anchor Light	2.0A	6A
Bow and Stern Lights	4.0A	6A
Side Lights	4.0A	6A
NUC Lights	3.8A	6A
Fuel Light	1.7A	6A
Pilot House Lights	4.0A	6A
Pilot House Deck Lights	4.0A	6A
Bilge Alarm	2.0A	6A
Port VHF	5.0A	6A
Sea Hail	4.0A	6A
Spare		6A
Port Head Lights	7.5A	10A

Total Load 42.0 Amps

Certification and Inspection -- At the time of the accident, the vessel had a current Certificate of Inspection and was outfitted with lifesaving and safety equipment as required by U.S. Coast Guard regulations for small passenger vessels (46 CFR Subchapter T Parts 175-187). The date of the Certificate was July 07, 1999 with an expiration date of July 07, 2002. The vessel had a re-inspection June 7, 2000 in accordance with U.S. Coast Guard regulations that required re-inspection within 60 days of each anniversary of the date of issuance of the Certificate of Inspection during each triennial inspection period (46 CFR Subchapter T Part 176.500). *Add. Drills*

Lifesaving and Emergency Equipment -- The vessel's fire fighting system consisted of two fire pumps, two 1-1/2" fire stations midships in the main cabin, six fire extinguishers, and one hose on the upper deck. The fire pumps were operated from the engine room.

The type and locations of the six portable extinguishers were:

- 1 2-1/2 lb. and 1 10 lb. dry chemical in the pilothouse;
- 1 15 lb. CO2 extinguishers on the main deck- forward;
- 2 15 lb. CO2 in the engine space;
- 1 15 lb. CO2 on the stern.

The vessel's lifesaving equipment consisted of 354 lifejackets, seven rigid buoyant apparatus⁵, 2 ring buoys with lights, 1 ring buoy with light and 60 foot line, 1 man overboard ladder, 1 fire axe, and 2 fire pumps. The engine room did not have a fixed fire suppression or detection system and was not required by Coast Guard regulations.⁶

Waterway Information

The *Port Imperial Manhattan* operated on a route between the 38th street terminal on the west side of Manhattan to Lincoln Harbor, Weehawken, New Jersey on the Hudson River. The currents in the Hudson River are influenced by freshets, winds and droughts. The currents usually set fair with the channels except in the vicinity of bends and wharves. The velocities of currents average approximately 1.3 to 1.6 knots.

Meteorological Information

On November 17, 2000, at the approximate time of the accident, there was partly cloudy skies and good visibility. The wind was Northeasterly at 10 to 16 knots. On the day of the

⁵ The rigid buoyant apparatus are flotation devices with a line attached around its periphery. Survivors in the water hold onto this line. The apparatus lacks a platform to support survivors in the water. The *Manhattan* was not required to carry rigid buoyant apparatus in accordance with 46 CFR Subchapter T part 180.207(d).

⁶ 46CFR Subchapter T-Part 181.115, Vessels in existence on March 10, 1996 comply with regulations on this date.

accident, the temperature of the Hudson River measured near Hastings-on-Hudson (north of Yonkers) was 50.7 degrees fahrenheit.

Toxicology

The company marine operations manager met the ferry *George Washington* at the Weekawken ferry terminal as it arrived with passengers and crew from the *Manhattan*. The manager took the crew to his office and informed them that they would be taken to the hospital for post-accident drug/alcohol testing. At approximately 2000, the three crewmembers were transported to the Palisades General Hospital by ambulance. At the hospital they underwent breathalyzer tests for alcohol and submitted urine samples for drug screening. The testing was not in accordance with DOT requirements, so the crew was re-tested the following morning by the company drug testing contractor (Medical Compliance Services). Test results were negative for all three crewmembers.

Post-accident tox collector and lab service used:

Palisades General Hospital
7600 River Road
North Bergen, N.J. 07047

Medical Compliance Services
P.O. Box 2987
Warminster, Pa. 18974

Survival Aspects

Emergency Actions of the Crew -- The Safety Board interviewed six of the eight passengers on board the *Port Imperial Manhattan* to gather information about the emergency response and evacuation process. By all accounts, the crew was credited with giving a good effort but the passengers did not feel that the crew was trained to handle the emergency.

The crew attempted to extinguish the fire and made no announcement to the passengers regarding the emergency. Deckhand #1 told the passengers to go to the bow without distributing the lifejackets. One passenger claimed that he had to return to the smoke filled main cabin and retrieve lifejackets. The account was confirmed by four of the other passengers. One passenger did see a crewmember bring lifejackets to the bow. One passenger did not have an adult sized lifejacket and was given a company float coat by deckhand #2.

Stowage of Life Jackets -- The lifejackets were stowed in two separate lockers at the aft end of the vessel. Additional jackets were stowed beneath a seat at the aft end of the vessel. The jackets that were removed from stowage and used during the emergency were clipped with the lifejacket straps and clips. The child-sized lifejackets were stowed with the adult size.⁷

⁷ IAW 46 CFR Subchapter T Part 180.78, each child sized life jacket must be stowed in a location that is appropriately marked and separated from adult life jackets.

Safety Placards and Briefings -- Coast Guard regulations require that a suitable instructive placard, a public announcement, or both, be provided to passengers to familiarize them with the type and location of lifesaving devices carried on board the vessel, including the location and donning procedures for lifejackets. One passenger stated that he knew where the lifejackets were stowed based on the placards. The passengers did not receive a safety briefing prior to departing the 38th St. terminal. The Coast Guard had granted a waiver from the safety brief because the voyage was less than 15 minutes in duration.

None of the passengers interviewed thought to take a lifejacket to the bow, nor did the crew did not instruct the passengers to take lifejackets to the bow.

Firefighting Actions by the Crew -- The master observed smoke coming from an engine room ventilator and sent a deckhand to investigate. He called a company vessel by VHF radio and requested it to standby. The master did not instruct the deckhands to close the ventilation dampers. The master did not direct the deckhands to secure the fuel supply. The deckhands used portable fire extinguishers and sprayed the agent into the engine room from the access door.

Emergency Response-- The initial call to the New York City fire dispatcher was relayed from the 911 operator. The call came from a passenger on board the *Manhattan*. The passenger remained on the phone until all passengers and crew were rescued. The call commenced at 19 hours-six minutes and twenty-eight seconds (19h 06m 38s) and ended at 19 hours-14 minutes and thirty-eight seconds (19h 14m 38s).⁸

A Marine division of the New York City Fire Department (Marine 1) was notified of the fire at 19 hours-seven minutes-thirty seconds (19h 07m 30s). Marine 1 reported to the fire dispatcher at approximately 1914 that the passengers were about to be taken off the boat.

The initial call into the fire dispatcher reported that the boat had departed from the 38th St. terminal. There were subsequent calls into the dispatcher from phones in Hoboken and Chelsea piers off 23rd St. in Manhattan. The vessel had drifted three quarters of a mile south in approximately twenty minutes, which created initial confusion in establishing the vessel's location.

Prior to the evacuation, there was confusion between the N.Y. fireboat and a company ferry boat. The *George Washington* began to approach the *Manhattan* but was told by the fireboat to back off. The fireboat attempted to come alongside the *Manhattan*, but the height of the fireboats deck was higher than the *Manhattan's* deck. After realizing that the passengers would not be able to climb aboard the rescue boat, the fireboat instructed the *George Washington* to go alongside the *Manhattan*. The *Washington* successfully evacuated the passengers from the *Manhattan*.

⁸ Times given by 911 operator and Fire Dispatcher use 24 hour clock. 2400 is midnight, 1200 is noon.

Crew Training in Emergency Procedures

Training Requirements – Coast Guard regulations do not require deckhands on small passenger vessels to hold Coast Guard licenses or possess formal qualifications; however, Coast Guard NVIC No. 1-91, "Recommended Qualifications for Small Passenger Vessel Deckhands," provides the marine industry with recommended qualifications and training for deckhands to ensure the safe operation of small passenger vessels.

Training provided by the company – All training received was on the job training during Coast Guard required emergency response drills. The deckhands received training at the monthly fire drills. The drill scenarios included responding to fires, man overboard, and abandon ship. The master would familiarize the deckhands in the use and location of emergency equipment. The most frequent drills were for fire and man overboard response. Abandon ship drills were rarely conducted.

The company provided the Safety Board with the Emergency Procedures section of its Marine Operations Manual. In the event of fire, the manual listed steps to be followed in the event of fire. The steps were:

1. Cut off the air supply.
2. If a fire in a machinery space, shut off fuel supply and ventilation.
3. Move passengers away from the fire and have them don lifejackets.
4. If necessary, the crew should prepare to abandon ship.

The company provided an Emergency Check-off for fires that directed the crew to:

1. For a fire at sea, cut off air supply to fire, close hatches, ports, doors and ventilators, etc.
2. For fire in the engine room, manually shut off fuel supply and ventilation in the burning space. Move passengers away from the fire and have passengers don lifejackets.
3. If necessary, prepare to abandon ship.

The company provided a record of fire drills conducted by all vessel captains from June 29, 2000 to November 6, 2000. The record does not include the name of the vessel that the drill was conducted on. There is no entry for abandon ship drills.

The company provided two completed copies of NY Waterway's Drills and Training records that the *Manhattan's* captain had submitted. The captain's comments for both drills did not describe the drill scenario.

The company provided a Station Bill. According to the bill, one of the duties of the master was to direct the efforts of the crew.

Vessel Damage

The IIC, investigators from the Coast Guard and New York Fire Marshal's office and a private fire investigator hired by NY Waterway, inspected the engineroom of the *Port Imperial Manhattan* the morning following the accident. The vessel suffered extensive fire damage in the engine room and in the main passenger cabin. The estimated repair cost was \$1.2 million. The most severe fire damage was in the aft port corner of the engine room near the steering gear hydraulic oil reservoir. The aluminum deck above the hydraulic tank had melted away. Frames on the port side aft of the engine room suffered fire damage. A number of windows in the main cabin were broken in order to extinguish the fire. The pilothouse suffered smoke damage.

An examination of the engine space showed a "V" pattern on the interior skin of the ferry. The pattern pointed to the area where the plastic junction (see 12 volt system) box would have been located. The junction box was never located.

The wires to the 12-volt system showed beading, which indicated shorting. At the point where the junction box should have been located, the wire had completely burned through. The connections at the two lug nuts that married the cables were loose.

Investigators found severed wires that matched up to other wires of the 12-volt system and the ends of the wires were beaded which indicated electrical short-circuiting.

The investigators then traced the *Manhattan's* twelve-volt DC system from the batteries to the pilothouse distribution panels. The vessel had two twelve-volt batteries that were located beneath the engineroom ladder. The batteries were connected by #2 AWG wires to separate knife switches.⁹ A third knife switch was available to provide crossover capabilities in the event one battery died. The knife switches fed to two 100 amp fuses and the wires continued from the fuse box to a plastic junction box located above the steering gear hydraulic reservoir tank. At the junction box, the supply wires from the batteries were married to the load wires that ran through the forward bulkhead to two distribution panels in the pilothouse. Each battery provided a supply load, via the distribution panels, to the pilothouse for individual circuits. An air supply duct was located directly above the junction box.

According to the company port engineer, the section of the circuit between the batteries to the junction box was installed during a 1992 modification when the vessel was converted from a 32-volt DC starting system to a twelve-volt system. The modification relocated the batteries from the forward engineroom bulkhead to the aft end of the engineroom beneath the ladder. The original wiring that ran from the forward bulkhead to the pilothouse did not have the reach to the batteries relocated position beneath the ladder. Therefore, the #2 AWG wiring, knife switches, fuse box and junction box were installed to provide the additional reach from the relocated batteries to the original wires.

⁹ AWG is American Wire Gage.

Other Information

New Jersey Electrical System-- Due to the similarities between the *Manhattan* and *New Jersey*, the Safety Board IIC and Coast Guard investigators conducted an examination of the *New Jersey's* 12 volt system. The investigators found evidence of a short in the cable insulation. The cable had cuts with burn marks indicating a short. The fuse had two 100 amp fuses for a system that had a probable load of 67 amps. The wiring between the fuses and batteries was undersized at #4 AWG. The fuse box was installed on the incorrect side of the junction box and would not provide the necessary protection. The Coast Guard issued an 835 to the *New Jersey* and did not allow it to proceed until the deficiency was corrected.